

Applicant: Naoki WATANABE

Title: Method and Apparatus for Copying and Backup in Storage...

Atty Docket No. 16869B-077300US

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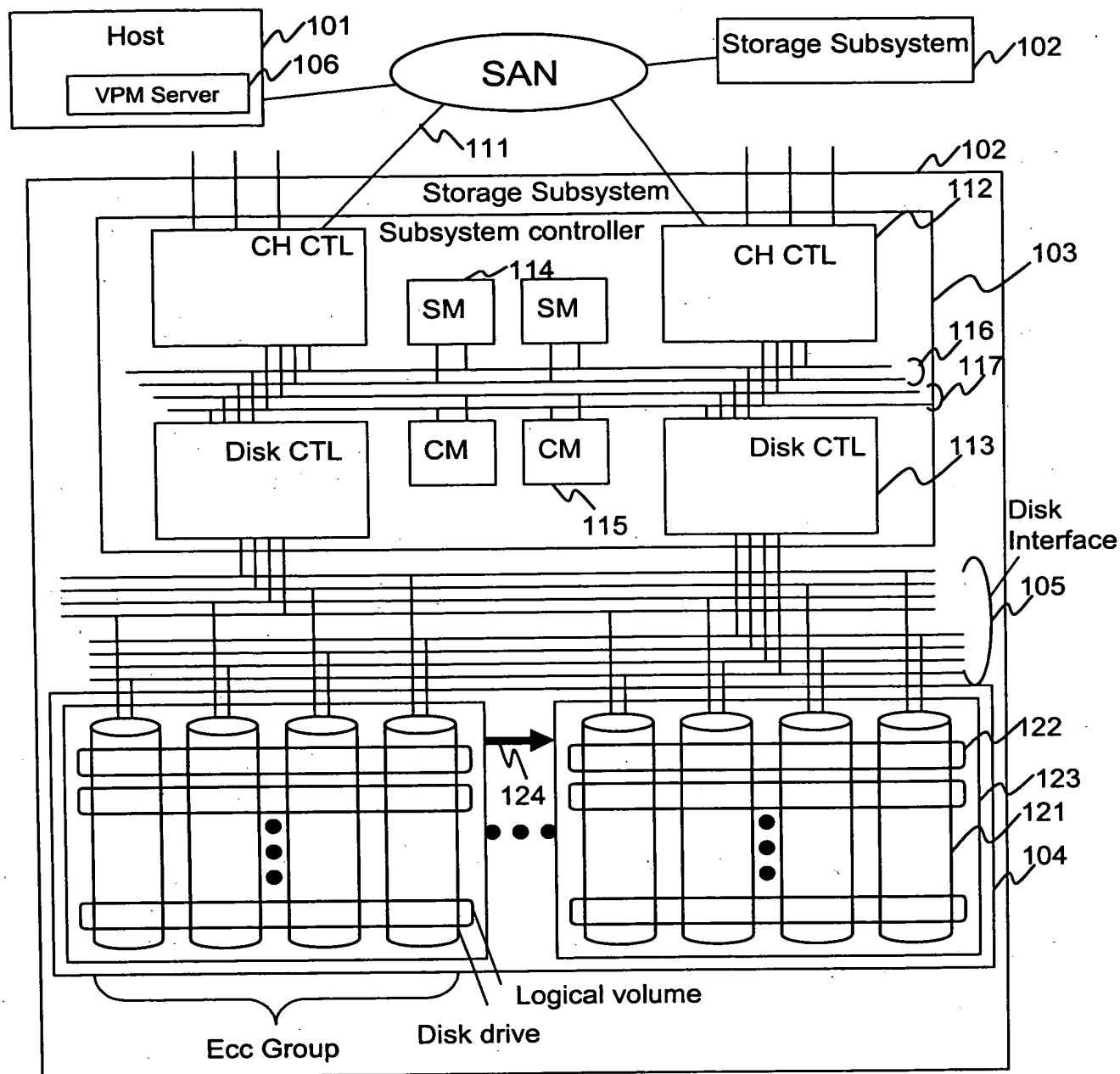


Figure 1 System Configuration

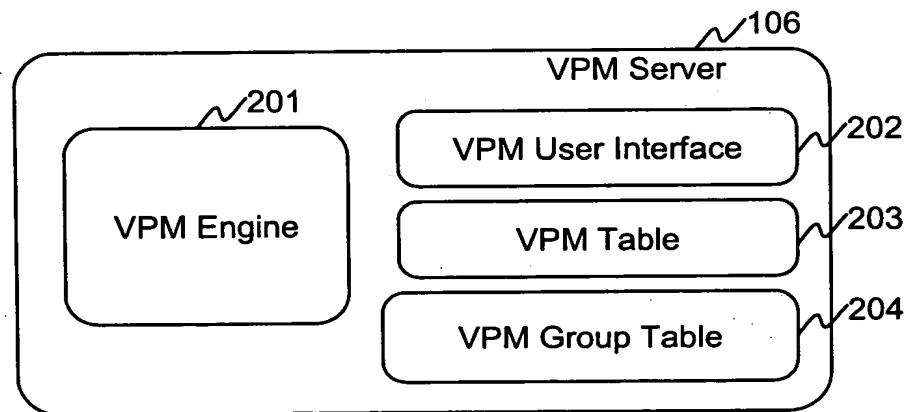
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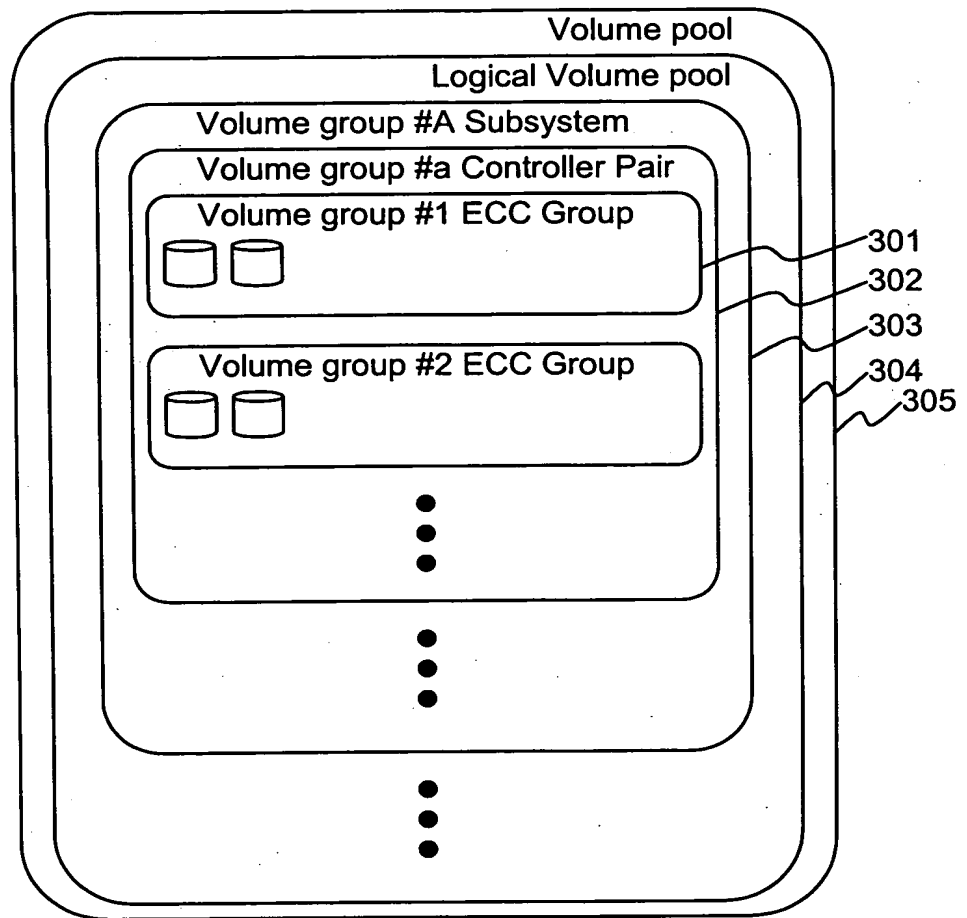
Figure 2 VPM Server

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Logical Volume pool: Site , department etc.

Figure 3 Logical View

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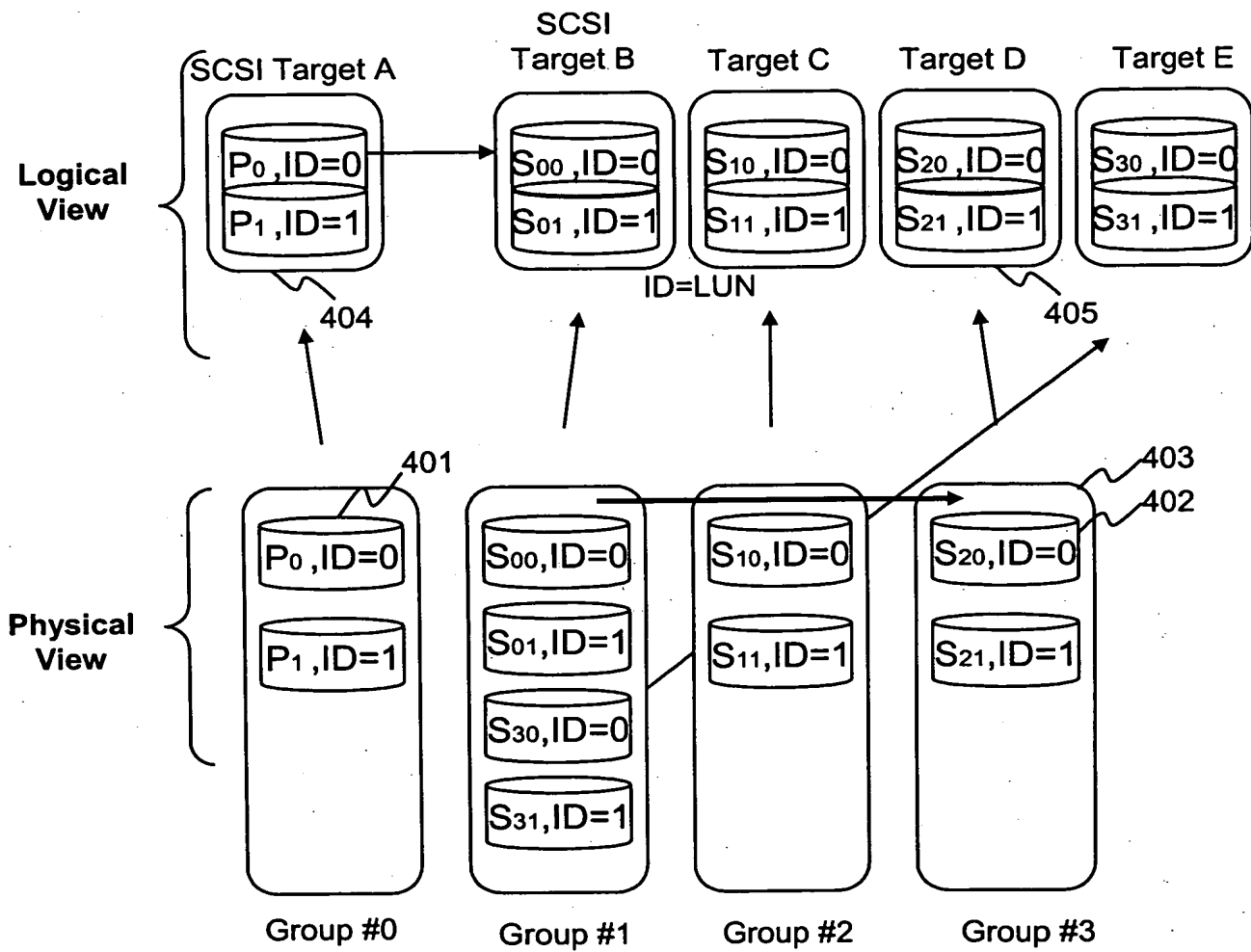


Figure 4 Layout - Horizontal

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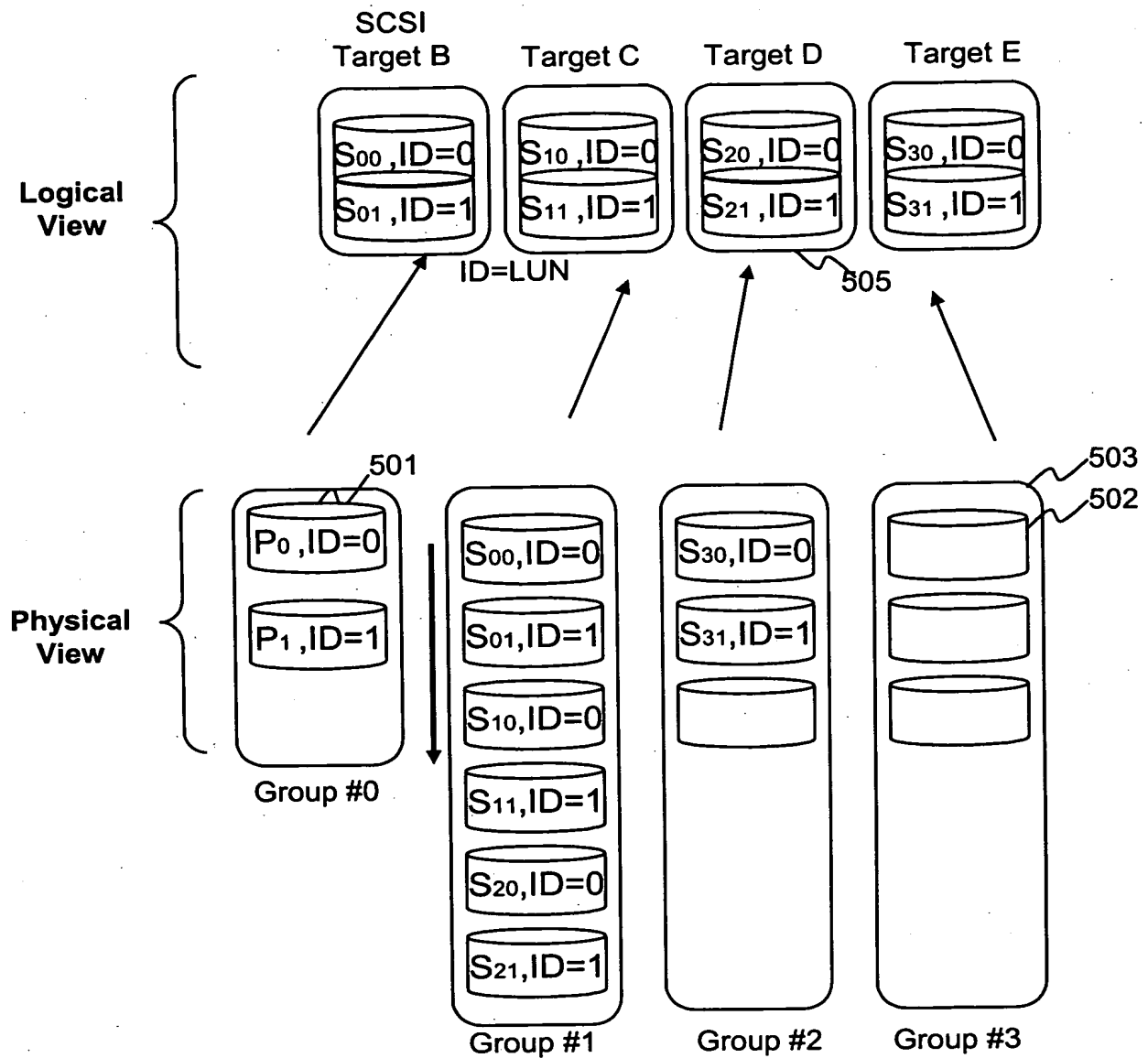


Figure 5 Layout - Vertical

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Site Gr. ID	Site	Dpt Gr. ID	Dpt	Sys Gr. ID	Subsystem
S0	NYC	S0D0	Account	S0D0S0	Hitachi 9900-1
		S0D1	Develop #1	S0D1S0	Hitachi 9900-2
		S0D2	Develop #2	S0D2S0	Hitachi 9900-3
				S0D2S1	Hitachi 9500-1
S1	SJC	S1D0	Develop #3	S1D0S1	Hitachi 9900-3
S2	SFO, Buld1	S2D0	Develop #4	S2D0S0	Hitachi 9900-4
S3	SFO, Buld2	S3D0	Develop #5	S3D0S0	Hitachi 9900-5

(a) Site group table

Controller	Number of Ecc gr.
C0	4
C1	6
C2	4
C3	4

(b) Controller group Table

Ecc Gr	Capacity	Used	Disk drive	Type
C0E0	280 GB	100 GB	SCSI 72GB, 10000rpm	2D+2P, RAID1
C0E1	420 GB	200 GB	SCSI 140GB, 7200rpm	3D+1P, RAID5
C0E2	420 GB	150 GB	SCSI 140GB, 7200rpm	3D+1P, RAID5
C0E3	280 GB	50GB	ATA 140GB, 7200rpm	2D+2P, RAID1

(c) Ecc group Table

Figure 6 Group Table

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Volume ID	Attribute	Pair ID
V000	SCSI Target A, LUN=0	P001,P002, P003, P004
V001	SCSI Target B, LUN=0	NULL
V002	NULL	NULL
V003	NULL	NULL
V004	NULL	NULL

(d) Logical volume configuration

Group ID	S0D0S0
Group Type	Subsystem
Name	Hitachi 9900-1
Capacity	10TB
Used Cap.	5TB
Reliability	High
Perf [IO/s]	2500 IO/s (10%)
Perf [MB/s]	20MB/s (5%)

(e) Group Information

Figure 6 Group Table

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Pair	Type	Source	Dist	Status	Perf
P001	Local	S0D0S0 C0E0V000	S0D0S0 C0E1V 000	Sync	2000 IO/s 8 MB/s
P002	Local	S0D0S0 C0E0V000	S0D0S0 C0E2V 000	Suspend (2002/10/10 10:00)	500 IO/s 30-MB/s
P003	Local	S0D0S0 C0E0V000	S0D0S0 C0E3V 000	Suspend (2002/10/11 10:00)	100 IO/s 400 KB/s
P004	Local	S0D0S0 C0E0V000	S0D0S0 C0E1V 001	Suspend (2002/10/12 10:00)	200 IO/s 800 KB/s
P005	Remote (Async)	S0D0S0 C0E0V003	S1D0S0 C0E1V 003	Sync	200 IO/s 800 KB/s

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Figure 7 Pair Configuration

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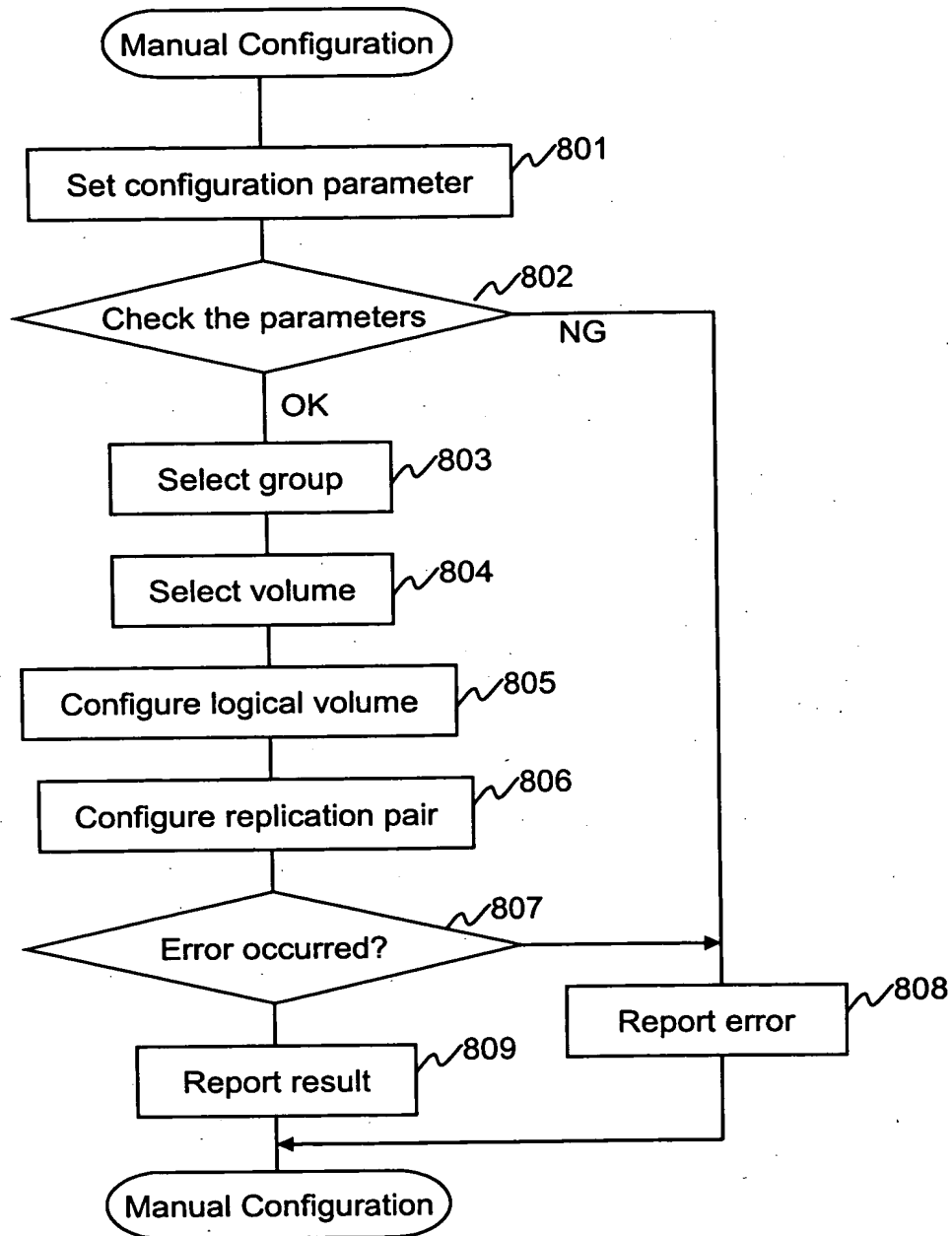


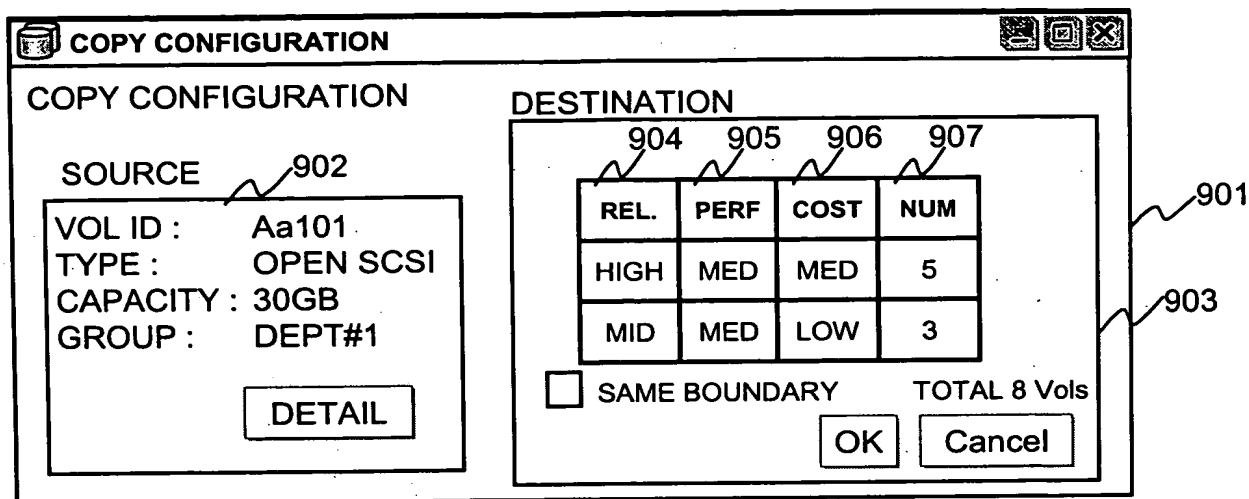
Figure 8 Manual Configuration

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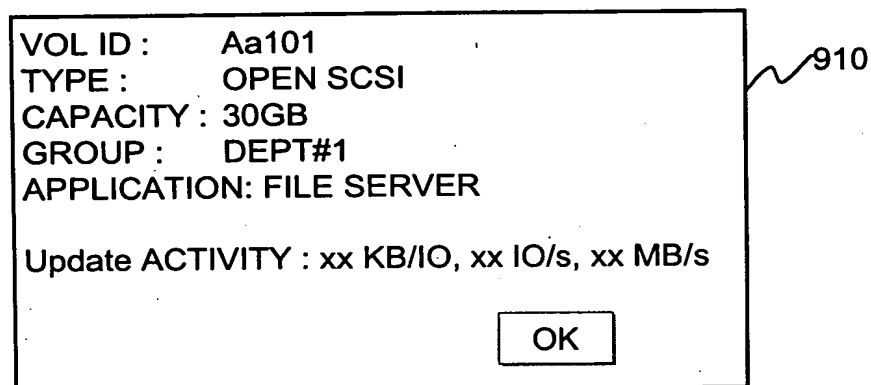
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The diagram shows a window titled "COPY CONFIGURATION" with a standard Windows-style title bar. It is divided into two main sections. The left section, labeled "SOURCE" with a pointer 902, contains a box with the following text: "VOL ID : Aa101", "TYPE : OPEN SCSI", "CAPACITY : 30GB", and "GROUP : DEPT#1". Below this box is a "DETAIL" button. The right section, labeled "DESTINATION" with a pointer 901, contains a table with four columns labeled "REL.", "PERF", "COST", and "NUM" (pointers 904, 905, 906, 907 respectively). The table has two rows of data: "HIGH", "MED", "MED", "5" and "MID", "MED", "LOW", "3". Below the table is a checkbox labeled "SAME BOUNDARY" and the text "TOTAL 8 Vols". At the bottom right of the "DESTINATION" section are "OK" and "Cancel" buttons. A pointer 903 indicates the right side of the window.

REL.	PERF	COST	NUM
HIGH	MED	MED	5
MID	MED	LOW	3

(a) Manual configuration window



The diagram shows a dialog box with the following text: "VOL ID : Aa101", "TYPE : OPEN SCSI", "CAPACITY : 30GB", "GROUP : DEPT#1", "APPLICATION: FILE SERVER", and "Update ACTIVITY : xx KB/IO, xx IO/s, xx MB/s". At the bottom right is an "OK" button. A pointer 910 indicates the right side of the dialog box.

(b) Source information

Figure 9 GUI #1 Manual Configuration

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COPY CONFIGURATION

COPY CONFIGURATION : BOUNDARY SETTING

	Vols	
<input type="checkbox"/> Other Gr.	160	4 Gr.s
<input type="checkbox"/> Logical Gr.	140	3 Subs
<input checked="" type="checkbox"/> Subsystem	60	3 Ctl
<input type="checkbox"/> Controller	20	4 Eccs
<input type="checkbox"/> Ecc Group	5	

OK Cancel

1002 1001

Figure 10 GUI #2 Manual Configuration

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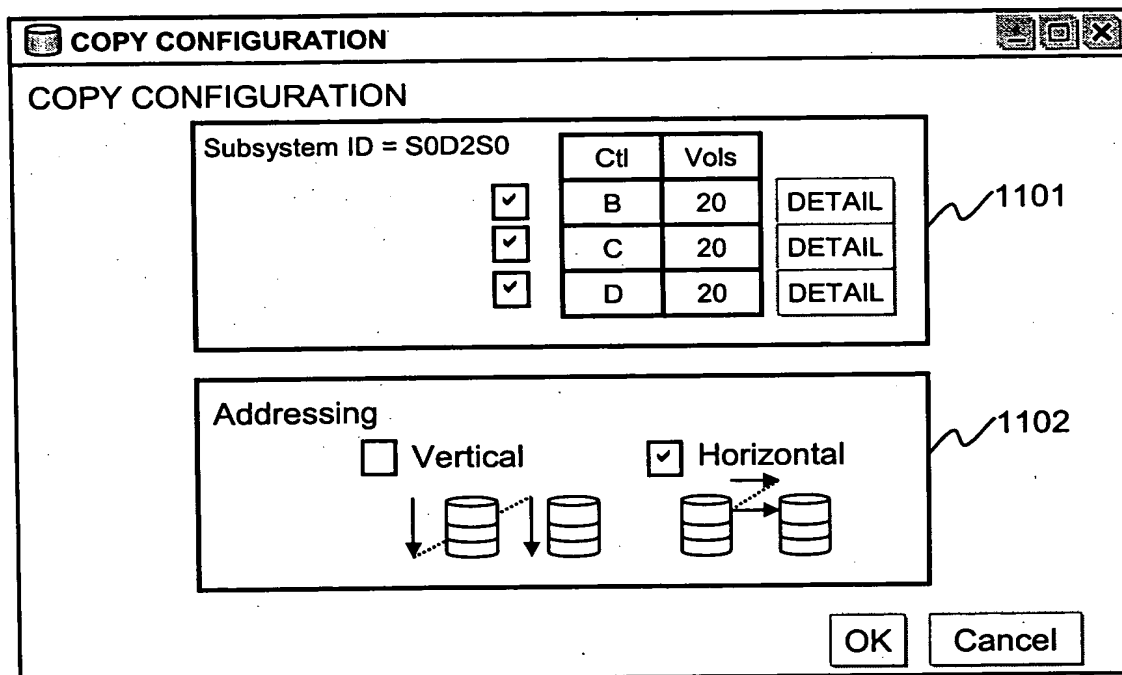


Figure 11 GUI #3 Manual Configuration

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The screenshot shows a window titled "USER GROUP" with a standard Windows-style title bar (minimize, maximize, close buttons). Inside the window, the text "USER GROUP CONFIGURATION" is displayed. Below this, there are two main sections. The first section contains the following text: "NAME : ACCOUNTING", "ID : 00", "TYPE : OPEN SCSI", "RELIABILITY: HIGH", "PERFORMANCE : MED", and "COST : LOW". A wavy line labeled "1202" points to the "RELIABILITY: HIGH" line. The second section contains the text "REPLICATION POLICY" and "WEEKLY BACKUP". A wavy line labeled "1203" points to the "REPLICATION POLICY" line. At the bottom right of the window, there are two buttons: "OK" and "Cancel". A wavy line labeled "1201" points to the right side of the window.

(a) User Group

The screenshot shows a window titled "APPLICATION CONFIGURATION" with a standard Windows-style title bar (minimize, maximize, close buttons). Inside the window, the text "APPLICATION CONFIGURATION" is displayed. Below this, there are two main sections. The first section contains the following text: "NAME : ACCOUNT DB", "ID : 00", "TYPE : OPEN SCSI", "RELIABILITY: HIGH", "PERFORMANCE : HIGH", and "COST : HIGH". A wavy line labeled "1211" points to the "TYPE : OPEN SCSI" line. The second section contains the text "REPLICATION POLICY", "DISASTER RECOVERY", and "DAILY BACKUP". A wavy line labeled "1212" points to the "DISASTER RECOVERY" line. At the bottom right of the window, there are two buttons: "OK" and "Cancel". A wavy line labeled "1210" points to the right side of the window.

(b) Application Group

Figure 12 GUI #4 USER GROUP

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POLICY = FULL BACKUP HYBRID

**SUB POLICY = DAILY BACKUP,
WEEKLY BACKUP**

Application = Hitachi backup Manager

(a) FULL BACKUP

**POLICY = DAILY BACKUP
ATTRIBUTE = REPLICATION**

**SPEED = HIGH
RELIABILITY = MID
COST = LOW**

**NUMBER OF VOLUMES = 6
COPY SPEED = HIGH**

**LOWER BOUNDARY = ECC
UPPER BOUNDARY = SUBSYSTEM
ADDRESSING = HORIZONTAL**

(b) DAILY BACKUP

**POLICY = WEEKLY BACKUP
ATTRIBUTE = REPLICATION**

**SPEED = HIGH
RELIABILITY = HIGH
COST = NULL**

**NUMBER OF VOLUMES = 1
COPY SPEED = HIGH**

**LOWER BOUNDARY = SUBSYSTEM
UPPER BOUNDARY = NULL
ADDRESSING = NULL**

(c) WEEKLY BACKUP

Figure 13 POLICY FULL BACKUP

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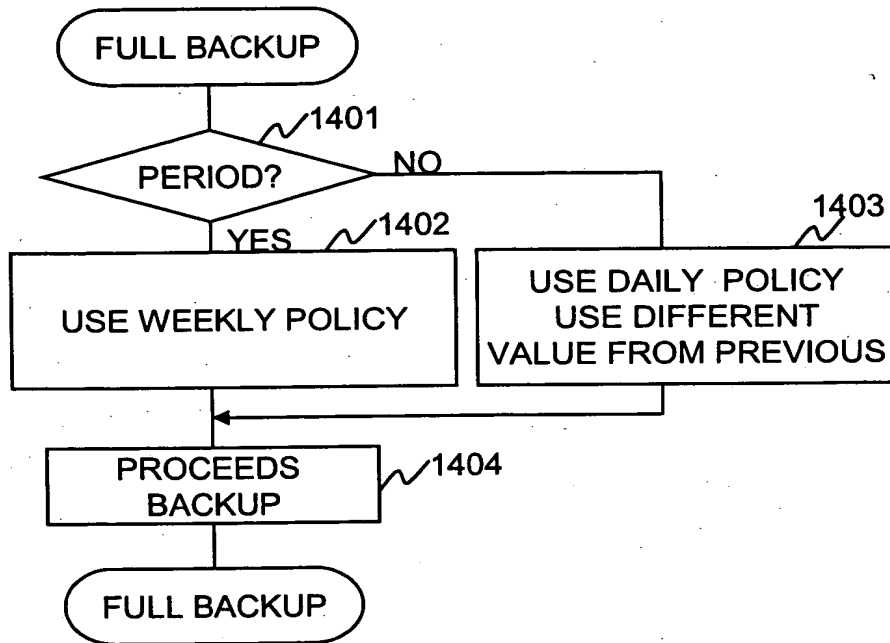


Figure 14 HYBRID BACKUP

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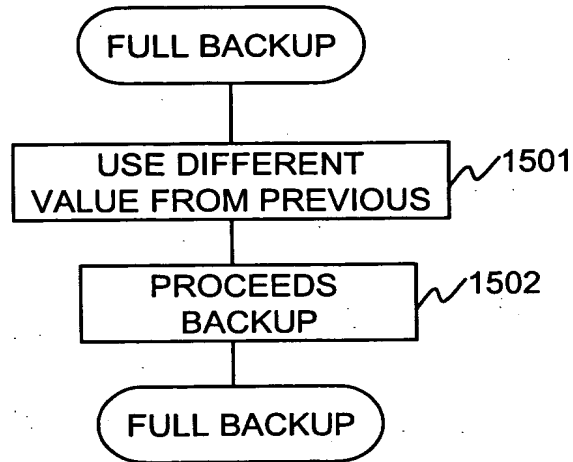


Figure 15 FULL BACKUP SCHEDULE

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POLICY = DIFFERENTIAL

SUB POLICY = DAILY BACKUP,
WEEKLY BACKUP

Application = Hitachi backup Manager

(a) DIFFERENTIAL BACKUP

POLICY = DAILY DIFFERENTIAL
ATTRIBUTE = ALONE

SPEED = HIGH
RELIABILITY = MID
COST = LOW

NUMBER OF VOLUMES = 6

LOWER BOUNDARY = ECC
UPPER BOUNDARY = SUBSYSTEM
ADDRESSING = HORIZONTAL

(b) DAILY BACKUP

POLICY = WEEKLY BACKUP
ATTRIBUTE = REPLICATION

SPEED = HIGH
RELIABILITY = HIGH
COST = HIGH

NUMBER OF VOLUMES = 2
COPY SPEED = HIGH

LOWER BOUNDARY = ECC
UPPER BOUNDARY = SUBSYSTEM
ADDRESSING = HORIZONTAL

(c) WEEKLY BACKUP

Figure16 DIFFERENTIAL BACKUP

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POLICY = DIFFERENTIAL

SUB POLICY = DAILY BACKUP,
WEEKLY BACKUP

Application = Hitachi backup Manager

(a) DIFFERENTIAL BACKUP

POLICY = DAILY DIFFERENTIAL
ATTRIBUTE = ALONE

SPEED = HIGH
RELIABILITY = MID
COST = LOW

NUMBER OF VOLUMES = 2
COPY SPEED = HIGH

LOWER BOUNDARY = ECC
UPPER BOUNDARY = SUBSYSTEM
ADDRESSING = VORIZONTAL

(b) DAILY BACKUP

POLICY = WEEKLY BACKUP
ATTRIBUTE = REPLICATION

SPEED = HIGH
RELIABILITY = HIGH
COST = HIGH

NUMBER OF VOLUMES = 2
COPY SPEED = HIGH

LOWER BOUNDARY = ECC
UPPER BOUNDARY = SUBSYSTEM
ADDRESSING = HORIZONTAL

(c) WEEKLY BACKUP

Figure 17 DIFFERENTIAL BACKUP

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POLICY = DISASTER RECOVERY

SPEED = HIGH

RELIABILITY = HIGH

COST = HIGH

NUMBER OF VOLUMES = 1

COPY SPEED = LOW (USER DEFINED)

LOWER BOUNDARY = SITE

UPPER BOUNDARY = NULL

ADDRESSING = NULL

Figure 18 Disaster Recovery